CMMI, Swiss Cheese, and Pareto

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Getting ready for a CMMI appraisal is rarely easy. But what if your organization is virtual, has critical 24/7 commitments, and overtime is the norm? What if key staff is overloaded and time available for CMMI is minimal? This article provides a case study showing how these obstacles can be overcome in preparation for a CMMI for Development (CMMI-DEV) Level 3 appraisal.

Imagine that you've just been asked to assume the role of process analyst and lead the effort for an organization to pass a CMMI-DEV Level 3 appraisal. Most of the 40-member staff has participated in earlier self assessments and the software developers are from a Level 5 company. Everyone knows about CMMI and its predecessors, primarily the Software CMM. The assignment sounds easy, right? Wrong!

While I've come across many organizations with similar challenges, this article will focus on a case study of one organization—for our purposes, I'll call them Company C—that overcame obstacles synergistically using the *Swiss Cheese Method* and the Pareto Principle.

The Work Environment

Company C's IT staff is mostly virtual with members in three states. The developers (subcontractors) are from India. The group is responsible for key company software and must be available 24/7. Overtime is the norm. Software upgrades are frequent and take priority. Time available for CMMI is rare. Meetings are held using WebEx, and deliverables are stored on SharePoint, Wikis, file servers, or laptops. There is no Process Asset Library (PAL) at the beginning.

Company C has improved software processes for years by facilitating workshops. Conference rooms are lined with flip charts showing process flows, data stores, artifacts, and more. But this approach doesn't work when the staff is absent or virtual, and the IT staff has only a few minutes available to help leadership at random times. What did Company C do?

Remember the Swiss Cheese Method?

Alan Lakein's 1973 book, "How to Get Control of Your Time and Your Life," introduced the Swiss Cheese Method and talked about how we can nibble away at a task or project. He suggested that when we only have five minutes or less, we should spend it on high-priority tasks and constantly nibble away at them. Otherwise, we slide the schedule and keep waiting until we have *enough* time to work on a task.

Project plans are rarely defined in minutes and doing so isn't recommended. In the case of Company C, the process analyst used the Swiss Cheese Method on critical path tasks. The process analyst did not get an hour of a functional analyst's time, but was given a few minutes after specifically detailing the help that was needed.

By using the Swiss Cheese Method in a variety of ways, Company C was able to:
- Identify source documents (versus multiple versions) for their PAL. More than 100 documents are put in the PAL.
- Obtain comments on sections, one at a time, of their quality plan and dozens of other process documents.
- Prioritize process improvement team actions. The team completes more than 100 actions prior to the appraisal.
- Resolve inconsistencies in documents under configuration management.
- Update portions of the project plan.
- Resolve dozens of internal assessment comments (one at a time).

Tools such as instant messaging helped identify these small blocks of time, even as little as five minutes. In effect, this allowed for the constant nibbling away at the hundreds of mini-tasks required to get ready for the appraisal. The process analyst worked with the staff to identify these small time slices every day and progress was closely measured.

Use of the Swiss Cheese Method required the process analyst to work much closer with the project manager as compared to a typical project. MS Project was used to develop the initial schedule, then Primavera P3e was used to manage the CMMI project. That's where another time-management concept, the Pareto Principle, came in handy.

Thank You, Vilfredo Pareto

Many of us have used the 80-20 rule, the more common term for the Pareto Principle. Recall that Vilfredo was an Italian economist who found that 80 percent of the land in Italy was owned by 20 percent of the population. His findings evolved into the rule that says, by one application: 20 percent of the time spent on the *vital few* yields 80 percent of the results—and 80 percent of the time spent on the *trivial many* yields only 20 percent of the results.

So what does that have to do with CMMI? When Company C's CMMI effort was started, there was no project plan, no PAL, few completed process documents, and multiple versions of key documents. And there was no common understanding of the definition of all 163 key areas (22 process areas, three defined by Company C). From a Pareto view, 80 percent of the time spent on process activities only yielded 20 percent of the target: 100 percent CMMI compliance.

Prior to the CMMI project, there was little evidence—by any measure—that the time was being well-spent. Vilfredo would be happy to know that Company C used his principle to help them focus on the *vital few* to obtain the largest portion, the 80 percent, of the positive results.

The process analyst and project manager reviewed the CMMI statement of work and associated work breakdown structure and schedules, and identified tasks in the *vital few* category, including:
- Updating the quality plan. This turned out to be a major task.
- Identifying metrics for each process area: to give proof that use of CMMI was yielding positive, measurable results in terms of cost, quality, and schedule.
- Establishing a quality audit program and conducting quality audits.
- Training for all Level 3 and some Level 2 Process Areas (presented in one-hour segments via WebEx).
- Updating self-assessment by using a proprietary spreadsheet for the staff to record their personal assessments by key area.

Software Defense Application

The article describes some creative techniques defense organizations can use to achieve 100 percent CMMI compliance in a virtual environment. This case study of a major contractor describes how the organization prepared for a CMMI-DEV Level 3 appraisal. Two of the techniques come from basic time management tenets: the Swiss Cheese Method and the Pareto Principle. Other lessons learned addressed the process improvement team, configuration management, and communications techniques.

Synergy of Swiss Cheese and Pareto

Tasks are constantly reprioritized in any big project, but determining which tasks are part of the *vital few* may not be an easy matter. Also, assignments are made and commitments agreed to throughout a project. But in Company C's production system, firefighting, frequent block points, and resultant overtime caused havoc with the CMMI schedules.

But judicious use of the Swiss Cheese Method and the Pareto Principle combined to help attain full CMMI compliance (Company C's CMMI appraisers called it *validation*) prior to the appraisal. Instead of juggling three or four balls, there were dozens of balls in the air at any one time.

Lessons Learned

Company C's experience can be applied to others planning a CMMI adventure. Here are some other lessons learned:

- Since onsite process *workshops* weren't feasible, virtual workshops were held. Instead of flip charts on the wall, the participants used a one-page graphic called the *project process flow*. This complex diagram showed every step of the project using Project Management Body of Knowledge categories such as planning, executing, controlling, and closing. Company C's dozens of process documents (completed and in-process) were identified. A sub-group was assigned to update the software development life cycle processes (another non-trivial effort).
- Throughout the project, a CMMI appraiser was involved. Periodic *validations* were performed to identify areas in compliance and those needing either improvement or time to become institutionalized.
- The list of participants in the appraisal constantly evolved. The Process Improvement Team (PIT) members negotiated the list with management to help assure that all job categories were adequately represented.
- PIT membership was also frequently negotiated with management. There are different types of analysts, developers, and support personnel. The scope of the PIT also evolved and helped focus on the *vital few* actions.
- IBM's Rational ClearQuest software was used for change requests and Rational ClearCase for deliverables (requirements, design, code, etc.). Getting these under configuration management was not a trivial effort due to multiple versions on file servers and MS SharePoint.

Process improvement is difficult work, including getting ready for a CMMI appraisal. But by using basic time management techniques, persistence, and creativity, organizations can maximize their probability of success. Lessons learned should be documented and shared with others. As the saying goes, "We're all in this together."◆
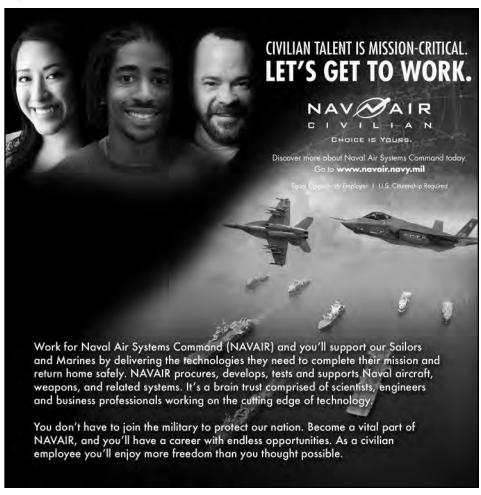
About the Author

Darrell Corbin is a process consultant and has been helping organizations implement CMMI and its major predecessor, Software CMM, since 1992. He retired from Boeing in 2006 where he was an associate technical fellow/process engineer, and helped them deploy software process improvement. While at Boeing, Corbin received Software Engineering Process Group certifications, and was a second management coach for Fujitsu's Macroscope Methodology. He has been an invited speaker at more than 100 conferences, professional society meetings, and universities, and has published 19 articles.

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